Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

On Permeability Dynamics in Carbonaceous Aquifers used in Energy Storage Applications[1] DS BRADY, BS TILLEY, Worcester Polytechnic Institute, M UECKERT, T BAUMANN, Technische Universitaet Muenchen — Geothermal energy harvesting applications use deep groundwater aquifers to store harvested energy. The impact of this additional energy to the aquifer chemistry is crucial for long-term operation. Gaseous CO2 is added to the injected water to compensate potential precipitates of carbonates and to prevent structural changes to the aquifer. Both of these effects affect the local chemical equilibrium of the aquifer, and we consider an effective model through homogenization which captures the hydrochemistry, heat transfer, fluid flow and permeability dynamics of the aquifer as heated fluid is added to the aquifer (injection), and as it is later removed (production). The impact of these different physical mechanisms of the heat storage performance of the aquifer is discussed.

[1]Support from the Bavarian State Ministry for the Economy is gratefully acknowledged

Burt Tilley
Worcester Polytechnic Institute

Date submitted: 24 Jul 2015 Electronic form version 1.4